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CARBIDE AND CARBON CHEMICALS COMPANY
K-25 PLANT

CHEMICALS DIVISION

Cascade Services

R. J. Clouse

K-1131 DECONTAMINATION REPORT

Distribution

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(Insert Name) COMPANY Carbide and Carbon Chemicals Company LOCATION Post Office Box P Oak Ridge, Tenn.

To Mr. J. Dykstra
Location K-402-4

Date February 7, 1955

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Subject K-1131 Decontamination

As a part of the feed facilities expansion program, The Maxon Construction Company was awarded the contract to carry out extensive revisions in K-1131. This building by nature of the process was highly contaminated with uranium salts and therefore required thorough decontamination before Maxon personnel could be permitted to work in the area.

On December 31, 1954, Cascade Services Department personnel started decontamination. This project was completed on January 17, 1955 at an approximate labor cost of $15,936, excluding plant expense.

To avoid duplication of work and recontamination of cleaned areas current progress records, consisting of shift log sheets detailing each shift's work and the status of the job at shift change, were maintained. This information was recorded on a master drawing to show on a daily basis the progress achieved, utilizing the following general decontamination methods: vacuum cleaning, steam cleaning, trichlorethylene cleaning, freon 113 degreasing, sandblasting, vacuum blasting and acid cleaning.

Vacuum Cleaning

All contaminated surfaces, including the building walls, ceiling, floors, structural steel, pipe, conduit, instruments, instrument racks, instrument panels, ducts, electrical panels, circuit breakers and transformers, were completely vacuum cleaned with the building system and portable Spencer vacuum cleaners.

Steam Cleaning

An air-steam mixing gun was used to clean certain portions of the building. This gun was adjusted to feed about 30% steam and 70% air. With this equipment excessive quantities of contaminated solution were avoided, and yet adequate steam flow was maintained to decontaminate surfaces.

Trichlorethylene Cleaning

Contaminated painted surfaces were wiped with a trichlorethylene-soaked cloth. The solvent partially dissolved the outer layer of paint, thereby removing approximately 95% of the surface contamination and 99% of the wipe activity.

Freon 113 Degreasing

All floor surfaces were degreased with "Freon 113" prior to acid cleaning. This solvent was used since it is the least toxic of the readily available degreasing agents.

Sandblasting

A standard sandblast unit was used to remove contamination that remained after steam or trichlorethylene cleaning. Before surfaces in an area were blasted all equipment that could be damaged by sand was covered with polyethylene bags. All re-used sand was screened to remove fines in order to reduce airborne contamination to a minimum. Following sandblasting all surfaces were vacuum cleaned to remove loose dust.

Vacuum Blasting

This was the first time that this type of method had been used for decontamination in the K-25 area. The vacuum blast operation may be considered in the following stages:

a) A pneumatic conveyor system transfers a continuous supply of steel chips (18 grit) to a nozzle shooting the chips with adequate velocity to remove the outer layer of the target surface.

b) A vacuum cleaning system simultaneously collects the spent steel chips and loose pieces of contaminated concrete.

c) A cyclone separates the large metal chips from the small pieces of concrete, and drops the steel chips back to the pneumatic feed hopper.

Acid Cleaning

All floor surfaces, tray and motor bases, after being degreased, were washed with either dilute nitric or hydrochloric acid to remove final contamination.

As the initial step in the cleaning program, all building surfaces were vacuum cleaned to remove the loose contamination. These surfaces were then classified into four groups, each requiring different decontamination techniques:

Group I

Walls, ceiling, structural steel, electrical conduit, pipe, instrument tubing racks, process equipment, ducts, staircases, catwalks, crane tracks, crane, insulation and fencing were first steam cleaned. This removed about 80% of the surface contamination. All areas which continued to show excessive contamination were either sandblasted or trichlorethylene cleaned.

Group II

The concrete floor surfaces were first degreased with "Freon 113" and then cleaned to an acceptable level with a 15% hydrochloric or nitric acid solution.

Group III

The ash pit was the most highly contaminated area in the building, with a surface activity in excess of 12,500 counts per minute and a beta-gamma level of approximately 200 milliroentgens per hour. These surfaces were first degreased with "Freon 113" and then cleaned with a nitric acid solution. However, the surface activity level remained relatively unchanged even after four acid treatments. The vacuum blast unit was then used and succeeded in reducing the maximum surface activity to 3000 alpha counts per minute, with a maximum wipe activity of 250 alpha counts per minute. The beta-gamma activity level was brought down to a maximum of 0.7 milliroentgens per hour.

Group IV

The fluorine generator rooms, power distribution rooms, control room, transformer rooms, electrical motors, pumps, blowers, instruments, fluorine generators, electrical breakers, electrical panels and rectifier room were vacuum cleaned to remove all loose material. Oily surfaces were degreased with "Freon 113" or trichlorethylene. Water or acid solution could be used only on exterior surfaces of the electrical equipment. The interior surfaces were vacuum cleaned and then wiped with clean dry cloths. All electric motors, pumps and blowers were completely degreased with trichlorethylene and wrapped with polyethylene bags to prevent recontamination. Instrument racks and control panels were vacuum cleaned and the exterior surfaces cleaned with dilute acid.

The alpha contamination audit made by the Health Physics Department while the K-1131 building was in operation showed a contamination index of 2546. The audit made by the Health Physics Department on January 16, 1955 following the decontamination program, showed an index of 159 and a 93.75% reduction in the levels.

The audit report data obtained on January 16, 1955 has been compiled and attached to this report to show, by areas, the condition of the K-1131 building as turned over to Maxon Construction Company.

Arrangements have been made to establish a monitoring schedule to be in effect throughout the construction period.

Acknowledgement

The assistance of the Health Physics Auditing group was very helpful throughout the entire program.

R. J. Clouse

RJC/hs

AREA AUDITED (Floors and Equipment)	TOTAL AREA sq.ft. Surveyed	TOTAL sq.ft. Aver. Cont.	TOTAL AREA PAL	CLASS I Surface % of Area	CLASS I Surface Max. Cont.	CLASS II Surface % of Area	CLASS II Surface Max. Cont.	CLASS III Surface % of Area	CLASS III Surface Max. Cont.	CLASS 0 Wipe % of Area	CLASS 0 Wipe Cont. Max. Cont.	CLASS I Wipe % of Area	CLASS I Wipe Cont. Max. Cont.	CLASS II Wipe % of Area	CLASS II Wipe Cont. Max. Cont.	CLASS III Wipe % of Area	CLASS III Wipe Cont. Max. Cont.
Blower area mezzanine between column lines 19 and 14	4000	2700	1300	92.59	2000	7.41	5000	0.0	0	42.22	<100	55.85	500	1.92	700	0	0
Surge, exchange area mezzanine between column lines 14 and 6	2250	1805	445	76.23	2000	19.05	10,000	4.70	12,500	22.38	<100	77.06	500	1.10	600	0	0
UF_6 area oper. floor from column line 14 to 6	2950	1854	1096	87.10	2000	10.46	8500	2.42	12,500	48.42	<100	51.80	350	0.0	0	0	0
VH area oper. floor from column line 4 to 1	1400	1069	331	77.85	2000	17.90	8000	4.20	12,500	0.0	0	100.00	500	0.0	0	0	0
Hydrogen rectifier room	360	360	0	100.00	1600	0.0	0	0.0	0	44.44	<100	55.55	300	0 0	0	0	0
Hydrogen generator room	360	360	0	33.33	2000	66.66	6500	0.0	0	50.00	<100	50.00	400	0 0	0	0	0
Fluorine Rectifier room	800	750	50	74.66	2000	16.00	3500	0 0	0	0.0	0	93.33	500	6.60	700	0	0
Cold trap area	3200	2080	1120	75.00	2000	25.00	3500	0.0	0	11.06	<100	88.94	350	0.0	0	0	0
Floor between column line 3 and 9 including ash pit	5000	4080	910	55.50	2000	44.49	10,000	0.0	0	38.98	<100	61.12	280	0 0	0	0	0
Vacuum cleaner room	490	490	0	69.38	2000	30.61	7500	0.0	0	10.41	<100	86.12	500	5.51	800	0	0
Fluorine generator room	4800	1300	3500	91.15	5000	9.30	2500	0.0	0	100.00	<100	0.0	0	0.0	0	0	0
Absorber room	1560	87	1473	85.06	5000	14.94	5000	0.0	0	0.0	0	56.32	500	43.68	1500	0	0
Control room	2000	11	1989	100.00	1000	0.0	0	0.0	0	72.72	<100	27.27	100	0.0	0	0	0
Refrigeration area	5600	3728	1872	62.12	2000	37.87	6000	0.0	0	4.72	<100	95.27	500	0.0	0	0	0
Metering room	800	0	800														
Passage area	800	0	800														

	Range Surface	(C/M) Wipe
CLASS 0	*	**
CLASS I	500 - 2,000	100 - 500
CLASS II	2,000 -10,000	500 - 2,000
CLASS III	10,000	2,000

* Class 0 is area which is below the P.A L. for surface reading but above the P.A.L. for wipe contamination.

** Less than 100 counts per minute wipe contamination.

[redacted] CONFIDENTIAL